ACE RC®

GYRO HELI

GT5

3-axis
Flybarless System

No.8085

Introduction / Security

The GT-5 is a high performance electric stabilizing 3-axis gyro, which was designed for flying helicopters flybarless.

The GT-5 can be used with a bride variety of receivers on the market. If you use Spektrum you can just use the satelites without the need of an additional receiver. We remind you that nor Spektrum neither we can guarantee the full range and funcionality if you use it only with the satelites.
Because of the variety of electronic manufacturers on the market we can give no guarantee for failures and consequentional damage, if an direct malfunction of the GT-5 cannot be detected.
We didn´t test the GT-5 in combination with turbine powered helicopters. For this reason we can give no clearance for using the GT-5 in turbines. If you want to use it with turbines anyway, the usage will be on your own risk.
We remind you, that the GT-5 is made for use in RC helicopters and for this reason it´s not a toy. Flying a helicopter has to be realized always on special, approved places with the usual security precautions in order not to harm yourself or property of other persons.
Any liability due to the mentioned notes in the upper part is disclaimed by the manufacturer, THUNDER TIGER EUROPE and the seller.

Features

- Very precise electric 3 axis stabilizing system
- OLED Display with Icon based User Interface
- „Touch-Pad" for easy handling without the need of additional hardware
- Supports normal PPM receivers, Spektrum & JR satelite-receivers, Futaba S-Bus receivers and many more…
- Suitable for Futaba and JR Servo- & RC-plugsystems
- Compact size and lightweight
- High-qualitative Aluminium Case for optimal heat sink

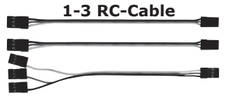
Spezifications

Display Screen	96 x 64 pixels OLED
Input	Touch Pad
CPU	32-Bit High Speed Processor
Sensor-Speed	MEMS mir ± 500°/sek for X-Y-Z Axis
Tail-Impulse	1500us/970us/760us
Tail-Frequency	50Hz – 333Hz
Swashplate-Frequency	50Hz – 200Hz
Swashplate-Types	90°, 120°, 135° (140°)
Dimensions	29,5 x 32 x 16mm
Weight	15g

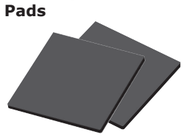
Included in Package

GT5

1-3 RC-Cable



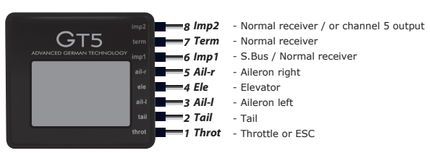
Pads

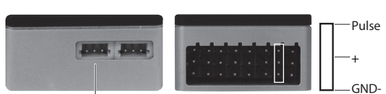


Manual

Note: The pads are very hard, but normally suited for all kinds of helicopters. For some Nitro helis or helicopters with a lot of vibrations you can use softer pads. Be careful with those soft pads, because they can cause malfunctions with the GT-5. **Allways use booth pads!**

Connectors





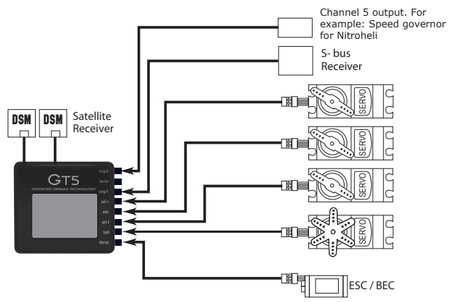
Connectors for 2,4GHz Spektrum Satellite Receiver
Note: If you use satelite mode you always must connect 2 satelites!

Note: The connector No.7 (Term) is a 3 Ch connector. It can be used with the 1-3 cable for usage with normal receivers for example.

Connecting with Receiver/ Satelites

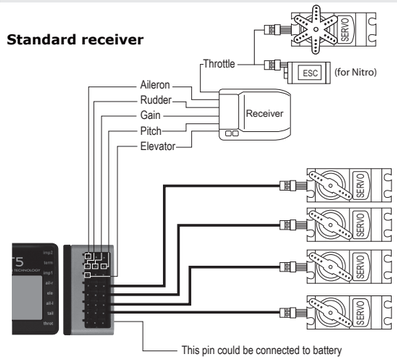
Spektrum Satellite receiver can be directly connected with the GT5. The favor is a very easy installation in which the GT5 is working as the main-unit at which you just have to connect the servos (please read the security note for using the GT5 without external receiver). You can also use the GT5 with Futaba S-Bus. here you just have to connect the S-Bus wire to the Ch6 of GT5. Because the tecnology with S-Bus and satelites change all the time we cannot give a guarantee of 100% compatibilty. For this reason the operation is at your own risk.

■ Spektrum/JR Satellite Receiver or Futaba S-Bus

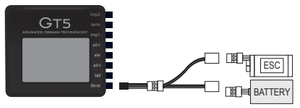


! For saving the servos of damage, the GT5 should be connected just with a receiver battery before you connect the servos and do the servo setup (next column, step 4). If you have an electric heli, also the ESC/BEC has to be configured and set correctly before you connect the GT5.

Standard receiver



■ Connecting battery / BEC

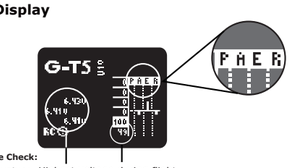


If you use the GT5 or S-Bus with an electric helicopter and you have a speed controller with integrated BEC, its not obligatory that you use an external receiver battery. With some BEC the volatge during hard flight can crash down. So we recommend paying attention to the manual of the ESC manufacturer. If you are not sure what to do you can always use an external battery for feeling more secure. The voltage of the external battery should be equal to the voltage of the BEC feed-in.

Important settings for the transmitter:

! All swashplate mixing is done by the GT5. In your transmitter you have to choose as swashplate type „mechanical or 1 servo for each function". So you MUST NOT choose in your transmitter a swashplate type like 120° or 140°. Also all servo travellings (ATV) should be set at -100 and +100 (Standard configuration for all transmitters). All servo centers should be at 0 and must not be trimmed at the transmitter. The pitch curve should be set from -100 to + 100 for configuration. After the configuration of the GT5 is finished you can set different pitch curves in your transmitter.

Display



Voltage Check:
Upper value: Highest voltage during flight
Center value: Voltage actually
Lower value: Lowest voltage(break-in)during flight

Total gain for swashplate and tail:
This function is for quick raising and reducing of the gyro gain for swashplate and tail. While flying there should be ideally displayed 100% gain. If you´ve set too much gain it doesnt matter if the heli is swinging up on swashplate or tail. You can push one switch for getting it to a pre-configured gain (e.g. 60%). Now the swinging on all axis should stop and the helicopter can be landed safely. Afterwards you can reduce the gain in the setup. For this reason we recommend to lift of with the lower gain and switch to 100% when the heli has a safety hight, if you´re flying with a new setup or changed gain. If the helicopter doesn´t swing up, the gain isn´t too high.

If the GT5 is working correctly, you can check the functionality of the sensors via the graphical bars in the display.

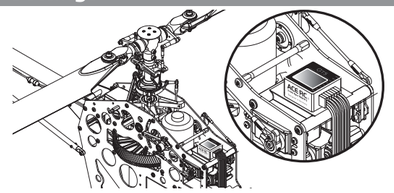
If you move the helicopter manually around its 3 axis, the connected bar should move upwards or downwards.

If the bars don´t remain at the center position after finishing the test it´s not a malfunction.

If you move the sticks at your transmitter, the bars also have to move.

If not you have to check your receiver in order for receiving failures.

Settings

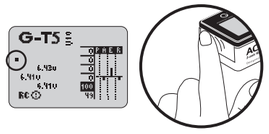


The GT5 has to be fixed perpendicular on the gyro plate of your helicopter!

First Settings

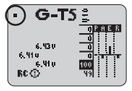
1 Starting the device

After the system has booted, a cursor will appear at the left side depending where you touch the reactive part of the case of the GT5.



2 General handling

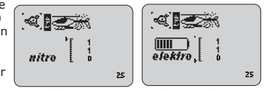
if you move the cursor upwards to the ACE-RC Logo and hold it there for 3 seconds, you will enter the main menu of the GT5. You can choose a menu entry with a double tap. You can exit a menu entry with a tap on the „exit" symbol or the icon which displays an arrow pointing upwards.



3 Choosing Nitro- or Electric-Helicopter:

In the swashplate menu (which you can recognize due to the swashplate icon on the left side) you should at first choose the type of helicopter (Nitro or electric).

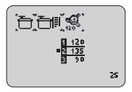
One example:
- Hold the ACE Logo 3 seconds
- Search the swashplate menu (use your finger to scroll up and down)
- Double tap on the swashplate icon
- Choose icon - Heli and text „type"
- Double tap
- Choose Nitro or Electric (use your finger to scroll up & down)
- Double tap for accepting



Nitro Electronic

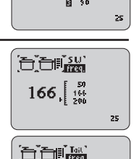
4 Swashplate - Setup:

Here you have to choose the kind of swashplate which is needed for your helicopter. More hints you will find on the back of this manual.

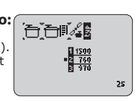


5 Servo-Frequency Setup:

Set the Servo-Frequency and speed. Please check which maximum values can be used for your servos. If one servo is built for 166Hz and you use it with a higher frequency setting (e.g. 200Hz) it could damage the servo.



Center impulse of the tail servo: For most tail servos the standard is 1500us (for 1520 also choose 1500). For narrow-band servos you can set 760. Please refer to the manual of your servo.



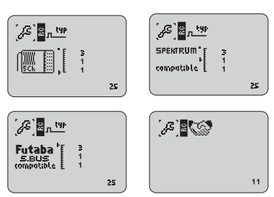
Servospeed: For tail and swashplate servos the performance can be set individually. If you don´t know what to set, choose 0,70.

If you choose too high values it could damage the servos. Some manufacturers display the servo speed for 60°, please calculate it for 45° yourself.

6 Receiver Setup:

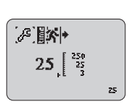
The GT5 supports three different kinds of receivers. Standard-receivers, Spektrum Satellites and Futaba S-Bus. If you use Spektrum-Satellites, you have to set this in the receiver menu (see graphic) to SPEKTRUM. Afterwards you choose the menu with the „shaking hands" and accept this with a double tap. Now the LEDs on both satelites have to flash. Afterwards press the Bind Button on your Spektrum transmitter while switching it on. After the binding procedure the LEDs on the satelites have to shine permanently. For checking if all functions are doing fine, switch both GT5 and transmitter off and turn it on again.

If you want to use a standard receiver or S-Bus you have to connect it with all the connected wires to the GT5 and select the receiver type in the menu.



7 Setup „Auto EXIT":

Before each flight you have to go back into the main menu of the GT5. If not, the heli would be controlled without stabilizing.
For security reasons we integrated an configurable Timer.
After a certain time (choosable between 3 and 250 seconds) the GT5 will automatically go back to the main menu if you don´t use it.
We´ve seen that a value of 25 seconds is suitable for most of the pilots, because normally between leaving the heli and starting the engine there pass 25 seconds.

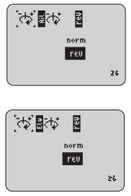


8 Setup swashplate Servo-directions:

here you have to adjust the direction of the 3 servos, so that all are going into the same direction while giving pitch positive or negative. If you give pitch positive control, the swashplate has to go either up or down. If one servo goes into the wrong direction you have to reverse it in the menu (Rev.). The right direction of pitch, aileron and elevator controls will be set afterwards in the transmitter, using the „servo reverse" function.

9 Setup gain direction of swashplate controls:

If the nose of the heli is pushed down, the swashplate has to move in the other direction and stay horizontally. If the heli is rolled to the left the swashplate has to move automatically to the right and stay horizontally. If this doesn´t happen the gain direction of the function which goes wrong has to be reversed in this menu.
if the direction of the aileron sensor is going in the wrong direction, you have to reverse the sensor function „Ail" in the menu. If the sensor direction for elevator is going wrong, you have to reverse the function „Elv" in the menu.



10 Setup gain direction of tail control:

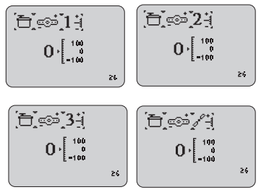
If the tail of the heli is pushed to the right, the tailrotor has to be controlled to the right by the GT5 (so that the tailrotor would blow to the right in order to set the tail again to the left). This you may never try with running blades, because there is too much danger of hurting yourself!

11 Setup pirouetting correction:

In the sensor menu you can choose the pirouetting correction named „Pir". If you enter with a double tap the test mode will be activated. Now the swashplate of the heli will be pushed into one direction. If you rotate the heli now in a circle, the swashplate should remain pushed into one direction. If the swashplate will change the direction during moving the tail, the pirouette correction has to be reversed by scrolling up/down with your finger. For safety reasons, please enter one more time this menu and repeat the test.
If you notice that your flown pirouettes are changing location, the value of this setting is not perfect. Please change the value and try it again until the piroutes run perfectly on the same spot.

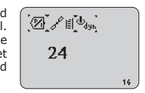
12 Setting the servo center point:

If you have 0° Pitch the servo horns should be going vertically (Doing a 90° angle to the rods). Is this then rotor head If you don´t have 0° Pitch with centered servo horns, you have to change the rods of your rotorhead.
The tail servo should also have an 90° angle from the horn to the rods. These trims you must not set in the transmitter but only in the GT5.



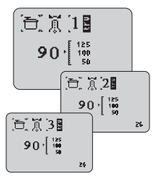
13 Tail-stick dynamic (stick-dynamic):

Stick dynamic has influence on the reaction speed between the control given until the reaction of the tail. For extreme reactions (3D flying) the value should be set to 50. Scale pilots can get a „softer" tail if they set this value to 25. The exact value has to be experienced by every pilot himself.



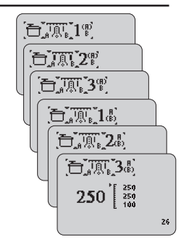
14 Servo Tavel - complete travel

First you have to set a value to all three servos, so that the swashplate will not bind mechanically while giving full controls. With this travel setting all controls for elevator, aileron and pitch will be reduced. You can adjust the pitch itself in an extra swashplate menu. You´ll find more hints on the back of this manual.



15 Servo limit swashplate

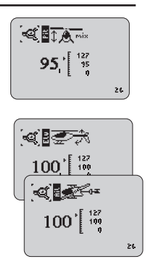
Normally it´s not necessary to change this values. But if the swashplate is binding while giving full aileron or elevator controls, although in the servo-travel menu the servos 1,2 and 3 were set to their minimum, you can reduce here the travel equally until there´s no more binding (check this in the main menu with the bars at 100% gain). The travel of the pitch will not be influenced by this setup.



16 Pitch travel & agility:

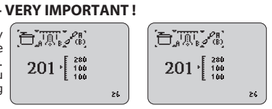
In the swashplate menu you can find the „Pit" Mix, here you can set the maximum travel of pitch. You should have a pitchcurve from -100 to +100 set in your transmitter. Now give full collective pitch and check the angle with a pitch gauge. Now you put this into the GT5. The pitch can be set later according to the idle up´s in your transmitter.

For the values aileron and elevator you will not set the minimum and maximum travel but the maximum agility. As a good starting point you can set it to 100. More hints for this setting you´ll find on the back of this manual.



17 Servo limit tailrotor - VERY IMPORTANT !

This adjustement is very important for saving the tailrotor servo from damage. After selecting this menu you can adjust both traveling directions of the servo.



Before connecting the servo the first time please remove the horn from the servo in order to avoid mecanical binding caused by too much travel. Please activate with by double clicking the tailrotor limiter (A) and give full tail control in one direction. If you change now the value you have to see how the servo is changing its travel endpoint. If you don´t see anything try giving control to the other direction. After doing this, adjust the travelling endpoint for (B). If you reduce the value you´ll reduce the endpoint, with higher values you´ll maximize the endpoint. When your setup is finished, the servo must not bind mecanically, equally in which direction you are giving tail control.

Adjustements

Menu: P/I Setup
Submenu of P/I Setup: Setup swashplate:

P	**P**	P is for the crispier stopping of the swashplate. Higher values result in a quicker stopping behaviour. Too high values lead to swinging.
I	**I**	I will lead to a constant rolling/flipping. Please try first tiny values (30%) and increase it until you get a constant roll/flip-rates. Do not increase it more after getting this result.
I-D	**I-D-stick**	This value should remain at 100 because then it´s perfect for fast travelling maneuver. More hints for I-D-stick you´ll find on the back of this page in the swashplate category.
D	**D-sense**	It has direct influence on the stopping behavior of the swashplate. If the heli is seesawing a bit after stopping it over elevator you should at first increase this parameter. Please increase this value in intervals of 5 and test the stopping behavior afterwards. More hints for finding the optimum swashplate adjustements you´ll find on the back of this page.
feed	**Feed forward**	The „directness" for the heli´s reaction on the given stick controls of the pilot. 3D pilots should try values about 80 until 95. If the value is too high, the heli will end in seesawing after stopping over elevator.
I-lim	**I-lim**	If the heli is not staying in one direction/height during flying forward and seems to fly a wave-line you can increase the I-Lim until the heli is flying straight forward. Normally you should not have to change this value.
hoover	**Hovering**	Controls how "stable" the helicopter is controlled by the GT5 during hovering. More stability = higher value. Our pilots used a value of 3-4.

! I-D-Stick and I-Sens are giving direct influence to the stopping behavior. Depending on your personal style you can adjust this values as you like. Normally you don´t have to change anything. Depending on the helicopters size, weight and the kind of rotorhead it´s possible that you´ll notice a seesawing effect after hard stopping over elevator. This effect is removable if you find the perfect adjustements of both values.

The adjustement of the tail stopping behaviour is working in the same style.

! If you use Spektrum satelites, Channel 7 is used for the total gain. if you use an external receiver, the center pin of the „term" connector of the GT5 is used for the total gain (center pin of the 1 in 3 cable)

Menu: P/I Setup
Submenu of P/I Setup: Setup tailrotor:

P	**P**	Higher value - quicker stopping at the tail and more stable when flying hard manovers. If the value is too high the tail will begin to swing. If it´s too low the tail will be very unstable
I	**I**	Is used for constant pirouettes. Start with 30% and increase the value until the pirouettes are constant during travelling figures. Value is too low = unconstant pirouettes. value too high = slow swinging tail
D	**D-Sense**	If the tail is not stopping fast enough you can optimize it here. Normally it should not be necessary to change this value.
D	**Tail-D-DB**	If the tail is swinging during hovering, you can eliminate this effect here (deadband), but just if there´s no other value adjusted wrong or a mechanical problem with the tail. Tiny value - tiny deadband
sym	**Tail-symmetric**	If you stop the tail and you can see that it´s stopping crispy in one direction but slow in the other you can optimize this here. please adjust the value until you have the same stop behaviour on both sides. Normally the result will be that the stopping behaviour on the one side is getting better and on the other worse. Now you can try with changing P and/or D-Sense to reduce/remove the after bouncing. If you wish you can also try the smooth stop function if you don´t reach a satisfying result. Normally there should not be any need to change the Tail-Symmetric values.
dyn	**Tail Stick-dynamic**	This value controls the reaction speed from the pilot´s input to the tail. 3D pilots should try a value of 50. Pilots who want to have a „smooth" tail (scale), should try a value of 25. if you adjust values more than 50, it´s possible that the tail will begin to swing
DMA cycl	**DMA-cyclic**	These two functions are working perfect is they are adjusted together. If the tail is moving sideways during pitch pumps, the DMA pitch can be increased until the tail will stay at the same position. If you need to adjust it to + or - depends on the heli/servo.
DMA pitch	**DMA-pitch**	You can control it before flight by giving pitch or cyclic controls when this function is activated. Now the tail should control versus the torque. The value of DMA cyclic is normally about 1/3 less than DMA pitch (e.g.DMA pitch: 30; DMA cyclic: 20)
	smooth-stop	It can be used for even harder stopping behavior. Normally you should not change this value. Under some circumstances it may overload the servo.

Please Note

If you have an electric helicopter please be sure that the motor cannot start running accidently and harm you or the helicopter itself.

In order to avoid this you can:

- Disconnect the wires between motor and ESC
- Connect the GT5 to a external battery without connecting the flight battery
- Move the pinion away from the main gear so in case of running motor the pinion will not reach the gear.

Hint: Some ESC´s with an built in BEC can run the GT5 so you don´t need an external bettery. Nomally this isn´t a problem for the GT5 as long as the voltage feed to the GT5 remains always stable. We think this is a great risk because if the voltage goes down of any case you cannot control the helicopter any more. If you use a external battery the GT5 will be feeded with voltage and at least you can autorotate the helicopter in this emergency case. If you want to use a additional battery is your own choice and should be selected depending of the manual of the ESC and your own decision of having this additional security or not.

Hints for Adjusting the Swashplate

Basics for Pitch adjustments (collective):

For beginning the adjustments of pitch in the GT5, you should at first be sure you have a pitch curve from -100 to +100 set in your transmitter. With this you can adjust the maximum and minimum pitch in the swashplate menu of the GT5 and control it using a pitch gauge. How much pitch you can adjust depends on the size, weight and the power of your helicopter. If you´re not sure try +/- 10/11° as a beginning.
If you adjust for example +/- 12° pitch as the maximum to reach, you can later set different flight phases where you can reduce the pitch, reducing the pitch curve in this phase. This is normally done for starting/landing where you normally should have a minimum of -3/4° pitch in order for not pressing the helicopter too much into the ground while giving negative pitch.

Basics for aileron and elevator (cyclic):

If you give maximum cyclic controls the swashplate may never be binding mechanically. This is the only basic rule you should follow for not damaging anything. How agile the heli will fly is adjustable in the transmitter and depends on your flight style. First you can leave the value for aileron and elevator with 100 in the swashplate menu. Now fly the helicopter and test if it´s agile enough. If the heli is to quick or too slow over one axis you can adjust this by changing the servo travel in the transmitter and the depending channel aileron or elevator. Higher values in the transmitter will lead more agility. If you reach the maximum value in your transmitter you can increase the value for aileron or elevator in the GT5 by adjusting more than 100.
Some pilots measure the cyclic agility by using a pitch gauge. Note that the collective pitch has to be 0° while doing this. Now give cyclic control and measure the pitch. As a starting point you should at least have about 6°. This is just an advice and normally not necessary that you measure it this way.

	Type	Here you can set if the GT5 is used in a Nitro or an electric helicopter.
	Pitch	Here you can set the maximum and minimum pitch, while having a pitch curve from -100 to +100 in your transmitter. Test the maximum reached angle by using a pitch gauge.
	Aileron	Aileron = agility for the aileron axis. Leave it at first with 100. Just in case that you need more agility and yet have reached the maximum in the transmitter, set it here.
	Elevator	Elevator = agility for the elevator axis. Leave the value at 100. If you want to change it, follow the instructions of aileron settings

You can imagine the agility of aileron and elevator like the pirouetting rate of the tail. If you increase the servo travel in your transmitter the pirouetting speed of aileron or elevator will be also increased. If the helicopter is standing on the ground you will not see any changes while changing the values. You´ll just notice it while the helicopter is airborne.

If you are adjusting the maximum pitch and you don´t have 0° while the stick is centered, please adjust the linkages of your rotor head and do not trim that in your transmitter.

Servo Menu

It´s recommended that you always use the perfect size of the servo horns . In the best case, the servotravel will be 100%. If this isn´t possible, you can adjust the travels in the GT5.

Servo - center:

	The servorhorn of the tail servo should have an 90° angle to the tail linkage. Try to reach this mechanically and just do the fine trim at the GT5
1	The swashplate should be as horizonbtal as possible. Please adjust it first mechanically as good as you can and then adjust the 3 servos perfectly in the menu. You can get perfect adjustments if you hover the heli and watch in which direction the heli drifts while hovering. Now adjust the depending servos 1-3 until the heli stays at one point. This procedure is not necessary and just for optimizing.
2	
3	

Servo- reverse (reverse servo travel direction)

1 norm	Here you can adjust the direction of the servos. Adjust them until all servos go into one direction if you are controlling pitch. The „right" direction of aileron and elevator functions can be set in the transmitter afterwards. You just have to change the direction of the function´s channel. If pitch and aileron is travelling right but elevator reversed, you just reverse the direction of the elevator servo in your transmitter.
2 norm	
3 norm	

Servo - Travel - Maximum travel

1 2 3	Please adjust all values equally so the swashplate will not bind (test with full cyclic and collective controls). Because this setting has influence to all functions, also pitch will be reduced. But it can be set aside in the swashplate menu. Just in case that there is not enough travel for pitch you have to use the menu „servo limit".

Servo -Limit

	Please adjust the maximum travel of both directions of the tailrotor. It must not bind!
1 2 3	This adjustments are just needed if your heli with perfect adjusted servo travels (means that the swashplate never binds with full controls) doesn´t reach in the swashplate menu the needed maximum pitch. In this case you can increase here the maximum travels and reduce the travels for aileron and elevator in the servo limit menu for not binding at full controls (the servo limit function will not have influence on pitch, but the servo travel function will reduce it).
	Normally you should just use the servo travel function, because you should get enough pitch with 99% of all heli mechanics).

Attention: All parameters in the following servo setup have to fit to the tecnical specifications of the servos. If you set higher values in the GT5 the servos can be damaged.

Servo Setup

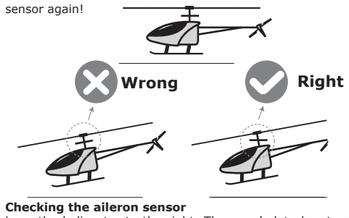
Tail type	Setting the center impulse of the tail servo. Standard is 1500us (also for 1520ys). Narrowband- Servos can be set to 760. This value has to be looked up in the servo manual.
Tail servo Speed	The servo speed is set according to 45°. Please take not which voltage the servo uses. With a higher voltage the servo will be working faster. Please refer to your servo´s manual for perfect setting. Some manufacturers just offer the speed for 60°. In this case you have to calculate the speed for 45°. e.g. speed for 60° = 0,08sec 0,08 / 60 = 0,0013 * 45= 0,06 for 45° So you set in GT5: 0,060
Tail servo frequency	Set here the frequency of the tail servo. Most of the digital servos for 500, 50 and 90 size helicopters can be used with minimum 166Hz. If you are not sure take this as a start point (at your own risk). Analog and tiny servos. 3-D are only available for high performance tail servos. Please refer to your servo´a s manual for finding the best settings.
Swash plate type	Adjust here the swashplate type. Helicopters with 140° have to bet set to 135°. For mechanical mixing just like the Raptor 50 or the Raptor 90/SE you have to adjust 90°.
Swashplate Servo speed	Please refer to the tail servo speed description above. Use the same procedure for the swashplate servos.
Swash plate frequency	Adjustment of the swashplate servos frequency. Most of the digital servos can be used with 166Hz. Please refer to the servos manual. Swashplate servos can be used up to 200Hz. The higher the frequency, the more performance you get.

Sensor Menu

If you want to check the sensor directions you have to be in the GT5 main menu (with the bars). It´s obilgatory to check elevator, aileron and tail sensors!

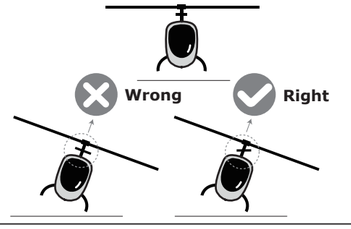
Checking the elevator sensor
If you push the helicopter with the nose downwards the swashplate tries to stay horizontal. If this doesn´t happen, or the swashplate moves into the other direction, go to the sensor menu Elv and reverse the direction. Afterwards check the sensor again!

Elv



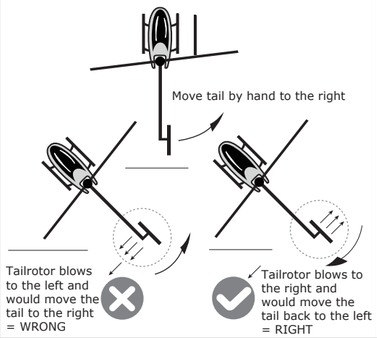
Checking the aileron sensor
Lean the helicopter to the right. The swashplate has to stay horizontal.If this doesn´t happen, or it goes into the other direction, go into the sensor menu Ail and reverse the function

Ail



Rud= rudder

Checking the rudder sensor
Move the helicopter in a circle, e.g. to the right. Now the GT5 has to control the rudder as if it would be controlling in the other direction (here to the left, as if the tailrotor would blow to the right).



Inst = Installation direction of the GT5
If the GT5 is installed with the display to the upper side, please set REV. If its installed in the other way, please set NORM.

Pirouette optimizer :
Activate the menupoint. Now the swashplate points at one side downwards. if you rotate the helicopter the swashplate has to stay leading in one direction. If the swashplate is pointing down to the left and you rotate the heli 90°, the swashplate has to keep pointing to down left.
If this is not adjusted right you may notice it by unstable pirouettes while hovering.

Sensor deadband Sets the wideness of the area where the sensors don´t regulate. The smaller the value, the smaller the deadband. Normally you don´t need to change this value.

Intensity of filter versus vibrations Normally you don´t need to change this value (2). The smaller the value, the less vibrations will reach the sensors (max. filterstrength = 0). A value of 5 means no filter. All vibrations can reach directly the sensors and the system will try to balance them (the servos will move a lot, more power consuption, more servo load. Attention: Servo damage possible!)

Stick Menu

You can adjust Expo in the transmitter or in the GT5. There is some expo by default in the GT5 in order to have not such aggressive controls transmission. Low values = aggressive reaction. High values = smooth reactions.

Expo – rudder	Expo for the tail rotor
Expo – swash plate	Expo for swashplate
Swashplate stick dynamic	Same function as in the swashplate P/I menu
D - Tail Stick	It is comparable to negative Expo and is just used by some 3D pilots. Normally it´s not necessary to change this value.
Tail stick dynamic	Same function as in the P/I menu of the tail rotor. 3D pilots should test a value about 50, scale pilots a number under 50.
Tail Stick - Deadband	This values should not be changed. here you could adjust a deadband for swashplate and/or tailrotor, where the helicopter will not react to your given controls
Swashplate Stick - Deadband	
Stick- calibration- tool	This value should not be changed. The GT5 will calibrate itself to the different transmitters. Under some circumstances it could happen that with very old transmitters you´ll need this menu item for calibrations. In 99% of the cases it should not be necessary!

Tools Menu

Aileron - Sensor calibration **Ail-scale-sensor**	Please do not change this values, because this represents the calibration of the 3 axis. After explication of all system symbols the adjustments will be explained in a grey hintbox. The best would be if you write down the start values, so you don´t need to demontate the GT5 for recalibration if you have changed the values accidentally.
Tail - Sensor calibration **Rud-scale-sensor**	
Elevator - Sensor calibration **Elev-scale-sensor**	
Aautomatically go back to main menu **Auto exit**	If you don´t use the GT5 for some seconds and you are in a sub menu, it will jump automatically back to the main menu.

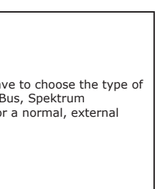
Normal receiver **FUTABA SBus** **SPEKTRUM Compatible**	Here you have to choose the type of receiver. S-Bus, Spektrum (Satelites) or a normal, external receiver.
Transmitter setting	This is just possible in connection with the use of Spektrum satelites. If the throttle/pitch is not working fine, you can change here between DX7 and MC22 (with Spektrum module).
Binding	Just with Spektrum satelites: Activate the menu item and both satelites will flash - the binding is active. Now keep the binding button on your Tx pushed and turn on the Tx. Binding should be complete now.
Reset to default	Factory setting. Recovers the standard adjustements
Transfer Data	This menu item has not a function yet and may not be used.

Calibrating elevator, aileron and tail sensors:
the calibration is done by factory and should not be changed!
If there is any cause of changing this values or if the values have been changed accidentally without writing down the factory values you can do the calibration here. Deinstall the GT5 from the helicopter, connect it with an external battery and switch it on. Now you can select the 3 different menu items of the sensors. First do a double tap to activate the menu item. Do another double tap to set the value to 0. Now rotate the GT5 around the given axis and you can see how the 0 changes it´s value. The value in the display has to change from 0 to 89 if you rotate it over 90°. If a higher number is played (e.g. 92) the value of the axis has to be adjusted. Do a double tap to activate the menu and change the value about 3, then save it by double tapping. After this procedure check the axis one more time to be sure everything is calibrated perfectly.

Hints for Adjustement

For the first test hover P and I should be set about 30-40% for swashplate and tail. Depending on your helicopter and your servos you can now increase this value step by step. If one P value is set too high you can see that with a fast seesawing tail or swashplate. If I is set too high the seesawing is acting more slowly.

For security reasons we invented the total gain feature. As you can see on the drawing, you can set the total gain to 100% or 60% for example (you can select a switch or a potentiometer for this). If you have Spektrum the total gain is Ch7 and with external receivers it´s the center pin of the 1in3 cable „Term" at the GT5 .

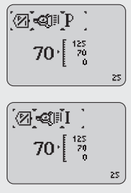


Now you can hover the heli with a total gain of for example 60%. The heli will feel a bit slow and unstable. If there´s no seesawing in swashplate or tail you can flight in safety height and switch to 100% total gain.

If neither the swashplate nor the tail seesawing you can land and increase just P until the heli is stopping crispy. If it´s beginning to seesaw you have to reduce P a bit.

If the stopping behaviour works fine with 100% total gain you can adjust I. I is for constantly pirouette rates for tail and constantly flipping and rolling over elevator and aileron. Don´t set I too high, this is an error a lot of pilots do.

You should adjust I until elevator, aileron and tail are working fine. If you are an advanced pilot you can test the pirouettes during fowrad flight for setting the optimum value. Beginner just can leave 40 or set it about 10 points under the P value. If P is for example 75%, adjust the I to 65%. If the tail or the swashplate begins to seesaw slowly, the I value has to be reduced.



If the heli should begin too swing up during flight, please remember that with the selected swith or potentiometer you can reduce all the sensor functions to a reduced value. Now the seesawing should stop.

Please remind that with the total gain also the maximum travel of the servos will be reduced. For this reason always leave 100% total gain if you are adjusting servo travels, swashplate etc. For this reason the heli feels a lot smoother if you change from 100% to 60%.

The faster the servos for swashplate and tail are, the higher you can adjust the performance (the stopping behaviour). Also the power of the swashplate servos are playing an important role, so please select good powerful servos. A servo for the 50/90class should at least have a power of 6kg. For hard 3D flying select servos which have at least 10kg. The more powerful they are, the better.

Swashplate - feed forward:

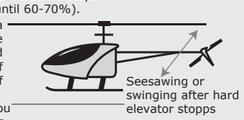
The secret of a direct and quick responding swashplate. If P and I for the swashplate are set, you can set the menu item „feed" (feed forward) This function controls how much given controls of the stick are passed directly to the swashplate without regulation. 3D pilots should set about 80-99. Set like this the heli will respond very quick to the given controls which is giving a very direct, crispy control feeling, comparable with a flybar rotorhead.

This value has to be tried out on the flying field in order to feel the difference and to find your own preferences.

If this value is set too high the heli may be swinging or seesawing after hard stopps over the elevator axis.

Elevator seesawing after hard stopps:
D-Sens and I-D-Stick :

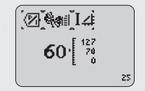
If the heli is seesawing or swinging after (and in case that the rotorhead and/or the mechanics are not causing this problem) you can try to increase the D-Sens value in steps of 5 until the stopping behaviour is perfect (until 60-70%).
If the seesawing still remains a bit, the I-D Stick function can be reduced a bit. For fast forward manovers a I-D-Stick value of 100% will be working better. If all this does not help, another problem causes this effect. If you have a small helicopter it can be possible that you have to reduce the I-D-Stick from 100 to 60-80%. For bigger helicopters it´s normally not necessary.



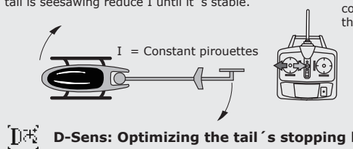
Tailrotor Parameter basics:

P is used for the stopping behaviour and holds the tail in it´s place if hard manovers are flown. If P is set too high, the tail will begin to swing/seesaw. If P is set too low, the tail will not stay in it´s position and it will not feel crispy but a bit unstable.

I means the consistency of the pirouettes. If you found the perfect P value, you can set I.Here you have to fly manovers which will need a lot of power for the tail (fast forward manovers). Advanced pilots can try this without 3D: Simply let the heli fly forward and rotate the tail. You should increase I step by step until the pirouettes are constantly. If you don´t want to test this, you can set a test value, which is 10 points lower than P. If the tail is seesawing reduce I until it´s stable.



Give full tail control for testing the constancy of the pirouettes.



D-Sens: Optimizing the tail´s stopping behaviour
If the tail will not stop crispy with full P value, you can optimize the stopping behaviour with D-Sens. Normally D-Sens is the half the P value. If P is 70%, you should start testing a D-Sens value with about 35%.

I-dyn: Tail-Stick reaction
Here you can adjust with the parameter I-dyn how quick the tailrotor will respond to the given controls of the pilot. 3D pilots will set a value between 45 and 50. Scale pilots will need values from 20-30.

Hint: Pirouette speed
The maximum pirouetting speed is set directly in the servo travel menu in your transmitter. Just select the depending servo channel (normally Ch4). The higher the value, the faster the tail rotates.

Hint: Agility of aileron and elevator
In the swashplate menu you´ll find the settings for Elv = elevator and Ail = aileron.Thesevalues should remain at 100. Just as the tail pirouetting rate you can adjust the elevator and aileron speed over the maximum servo travel in your transmitter. If you reduce the servo travel for elevator from 100 to 70 in your Tx, the speed in which the heli does flips over eleveator is slowing down. If you want to increase the agility you have to increase the servo travel in your Tx (you can adjust it over 100% if it´s needed). If the maximum travel in your Tx is not enough, you can adjust more than 100% in the GT5

The GT5 has a lot of adjustment possibilities. At the beginning it may seem a bit complicated, but it will be possible to reach the perfect settings for your personal flight style. Further you can reach a very high performance which is not possible with other systems (or systems which have „rigid" setups). For this reason we created a very flexible and high performance system especially for you.

If you change any settings in the GT5, please just change one setting at once. If you do this, you can „feel" the effect" and decide if you like the changes. If you change too much settings it may result a bit confusing and you won´t find your personal perfect setup.

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